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(54) NON-WOVEN FIBROUS MATERIAL PAD AND METHOD
OF MANUFACTURE THEREOF

(71) We, PORTWAYS LIMITED, a British Company of Tipton, in the County of Stafford, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a non-woven fibrous material pad and to a method of making a non-woven fibrous pad.

It has been proposed to make a non-woven fibrous material pad comprising a felt of a fibre material having a coating of an adhesive material applied to the upper and lower surfaces of the felt to consolidate the surfaces of the pad and it has also been proposed to form the pad in two layers, namely upper and lower layers, and to superimpose the two layers after coating some or all of the surfaces of the two layers with an adhesive, so as to form a "sandwich" arrangement with a layer of adhesive between the two layers of felt.

This improves the cohesion of the fibre pad, particularly if the pad is relatively thick and also improves the springiness of the pad and reduces "bottoming", that is the virtually complete compression of the material so that it ceases to become effective as padding.

It has also been proposed to make the pad of three or more layers with an adhesive layer between each layer of felt.

It is very desirable to control the thickness of the individual felt layers and also to ensure that the adhesive layer or layers is or are continuous and it is therefore an object of the invention to provide a non-woven fibrous material pad and a method of making such a pad whereby such control of thickness can be performed easily and inexpensively and wherein the continuity of the adhesive layer or layers can be ensured.

According to one aspect of the invention, there is provided a non-woven fibrous material pad comprising at least two layers of a felt made of fibres, secured together by means of an adhesive forming an adhesive interlayer or interlayers between adjacent felt layers, the adhesive itself being coloured or including a pigment, the colour of the adhesive interlayer or interlayers differing from the colour or colours of the adjacent felt layers, whereby there is provided a visible indication of the thickness and continuity of the felt layers and the adhesive interlayer or interlayers.

The pad may comprise only two layers of fibre felt material and a single interlayer of adhesive.

An additional coating or coatings of an adhesive may be provided on either the upper surface or the lower surface or both the upper and lower surfaces of the non-woven material pad.

The additional coating or coatings may be colourless or may be formed of an adhesive which is itself coloured or which includes a pigment.

According to another aspect of the invention, there is provided a method of making a non-woven fibrous material pad comprising the steps of forming two continuous felt layers of indefinite length, each felt layer comprising a plurality of fibres; coating at least one surface of one of the layers with an adhesive which is itself coloured or which includes a pigment, the colour of the adhesive differing from the colour or colours of the felt layers; superimposing the two layers of felt so that the adhesive coating forms an interlayer therebetween; and causing or permitting the adhesive to set and bond the two felt layers together, so as to provide a visible indication of the thickness and continuity of the felt layers and the adhesive interlayer.

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In carrying out the method, a moving open mesh belt conveyor may be used to support each of the felt layers and the adhesive may be applied by spraying.

5 Additional coatings of colourless adhesive material may be applied to some or all of the surfaces of the felt layers which have not been coated with the adhesive which is coloured or includes a pigment.

10 For example, one layer may be coated on one surface only with an adhesive which is itself coloured or which includes a coloured pigment, said one layer then being superimposed on said other layer with the adhesive between the layers to form the non-woven material. The pad is then coated on its upper surface with a colourless adhesive and then inverted and coated on its other surface with a colourless adhesive.

Alternatively, the additional coatings applied to some or all of the surfaces of the felt layers may be of an adhesive material which is itself coloured or which includes a coloured pigment.

25 It has been found to be advantageous to make a non-woven fibrous material pad for use as padding or insulation in upholstery or clothing, from synthetic fibres rather than from natural fibres, such as coir, since synthetic fibres tend to be more regular in size and shape than natural fibres and therefore wear more evenly and do not agglomerate, as may be the case with natural fibres. Additionally, synthetic fibres are cleaner than natural fibres and it may also be more economical to use synthetic fibres, due to fluctuations in price and availability of natural fibres from time to time.

30 Preferably, therefore, the non-woven fibrous material according to the invention comprises a suitable man-made or synthetic fibre, such as, for example, polyester, acrylic, modacrylic, triacetate or rayon fibre or may comprise a mixture of such fibres, one suitable mixture comprising by weight substantially 45% of a crimped polyester fibre and 55% of a crimped acrylic fibre.

35 The adhesive may comprise a resin and preferably a cross-linkable acrylic copolymer binder resin and may include a suitable pigment.

40 A non-woven material pad according to the first aspect of the invention and made by a method according to the second aspect of the invention will now be described in more detail by way of example only with reference to the accompanying drawings therein.

FIGURE 1 is a diagrammatic side elevation of part of a pad embodying the invention,

65 FIGURE 2 is a diagrammatic side eleva-

tion of the apparatus used in carrying out the method, and

FIGURE 3 is a diagrammatic plan view of the apparatus of Figure 2.

Referring to Figure 1 the pad is shown at 10 and comprises an upper layer 11 and a lower layer 12 of a synthetic fibre felt material and it should be appreciated that the word "felt" as used herein is intended to mean conventional felt and include materials which are referred to in the trade as "high loft" materials and which are usually made from crimped fibres, such materials also frequently being referred to in the trade as "fleece".

70 The synthetic fibre felt material is formed from a plurality of crimped polyester fibres, arranged at random in a thick continuous layer of indefinite length, but it should be appreciated that, for the purposes of this invention other fibres may be suitable, such as for example, cotton, wool, jute, acrylic, modacrylic triacetate, rayon or polypropylene fibre, or a mixture of fibres, one suitable mixture comprising by weight substantially 45% of a crimped polyester fibre and 55% of a crimped acrylic fibre.

75 The upper surface 13 of the upper felt layer 11 is coated with a colourless resin material 14, such as a cross-linkable acrylic copolymer binder resin and the lower surface 15 of the lower layer 12 is similarly coated with a layer of colourless resin 16.

80 Between the upper and lower layers of felt 11 and 12, there is a layer 17 of a coloured resin material which again comprises a cross-linkable acrylic copolymer binder incorporating a pigment, and this coloured resin interlayer secures together the upper and lower felt layers 11 and 12 and forms a visible indication of the thickness and continuity of the felt layers and of the continuity of the resin layer itself.

85 Thus, when the pad 10 is viewed from a side edge, along a line parallel with the upper and lower layers 11 and 12 of the pad and parallel with the resin layer 17, the thickness of material appearing above and below the layer of coloured resin can be judged by eye and the presence of the coloured resin enables even an unskilled operative to control the manufacture of the pad in such a way as to produce the appropriate thickness for the upper and lower layers. Also, the presence of the coloured pigment in the resin layer enables it to be easily detected and provides an immediate indication if the resin layer is not present between the upper and lower layers of felt.

90 The pad described above is made in a continuous strip of indefinite length by the method now to be described.

Referring to Figures 2 and 3, the appar-

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atus comprises two conveyor belts 20, 21 formed of open mesh material and each belt moves continuously under a hopper 22 and a pair of carding machines 23. The belts 20, 21 feed material to a further conveyor 24 again made of open mesh material in a conventional manner. The conveyor 24 transports material in a direction at right angles to the conveyors 20, 21.

10 The conveyor 20 feeds material to a first plating machine 25 positioned above the conveyor 24 and the machine 25 plates the material onto the conveyor 24.

The conveyor 24 transports the material 15 to a first spraying zone 26 at which a layer 27a of coloured resin material as described hereinbefore is sprayed onto the first layer 27 of the material formed on the conveyor by the plating machine 25.

20 The conveyor 24 then transfers the sprayed layer 27 beneath a second plating machine 28 to which material is fed by the conveyor 21. The plating machine plates a second layer 29 of material on top of the sprayed layer 27.

25 The conveyor 24 then transports the material beneath a second spraying zone 30 at which a second layer of resin material is sprayed on the layer 29 to form a layer 31.

The thus sprayed layers are then transported by the conveyor 24 through a drying oven 32 and then passed a third spraying zone 33 where a further layer 34 of resin material is provided on the underside of the layer 27.

The thus formed non-woven fibrous material pad is then transferred by the conveyor 24 to a conventional take off 35.

40 The material sprayed on at the three spraying zones may comprise any of the materials described hereinbefore as being suitable. For example, if desired, the layers 31 and 34 may be made of a coloured resin material or a resin material incorporating a pigment if desired.

Because the above described process is continuous the interlayer i.e. the layer 27a provided between the layer 27 and 29 of fibrous material forms a useful indicator in the following ways.

Firstly, it is immediately apparent, when the pad is viewed from the side, that it is parallel to the layers of felt and parallel to the coloured adhesive interlayer, whether the thicknesses of the felt layers are the same or whether one is thicker than the other, and also whether the thickness of each layer is consistent. Secondly, if the pad is viewed from the upper or lower surface, it is possible by visual inspection to detect regions where the density of packing of the fibres forming the upper and lower felt layers is higher or lower than normal, these regions being visible as irregularities

in the otherwise uniform colour of the pad.

Since the resin interlayer assists in maintaining the cohesion of the pad, it is desirable that this layer should be continuous and discontinuities are easily detected by eye due to the absence of the colouring at the position of the discontinuity.

When any of the above mentioned defects are noted in the pad which is being continuously produced, the appropriate action can be taken to prevent the defect from occurring, for example, the supply of coloured adhesive can be renewed in the case of discontinuity of the adhesive interlayer, or steps can be taken to increase or decrease the thickness of either or both of the fibre felts. Thus, the production of pads by the method described above allows for easy inspection and easy control of the finished pads.

The term "coloured" is used herein to refer to all colours as distinct from a transparent material. It is preferred, when the felt layers are of white material that the interlayer is of a blue colour. If however, the felt layers are, for example, black then the interlayer could be white.

WHAT WE CLAIM IS:—

1. A non-woven fibrous material pad comprising at least two layers of a felt made of fibres, secured together by means of an adhesive forming an adhesive interlayer or interlayers between adjacent felt layers, the adhesive itself being coloured or including a pigment the colour of the adhesive interlayer or interlayers differing from the colour or colours of the adjacent felt layers, whereby there is provided a visible indication of the thickness and continuity of the felt layers and the adhesive interlayer or interlayers.

2. A pad according to Claim 1 wherein the pad comprises only two layers of fibre felt material and a single interlayer of adhesive.

3. A pad according to Claim 1 or Claim 2 wherein an additional coating or coatings of an adhesive is provided on either the upper surface or the lower surface or both the upper and lower surfaces of the pad.

4. A pad according to Claim 3 wherein the additional adhesive coating or coatings is colourless.

5. A pad according to Claim 3 wherein the additional coating or coatings comprises an adhesive which is itself coloured or which includes a pigment.

6. A pad according to any preceding claim wherein the adhesive comprises a cross-linkable acrylic copolymer binder resin.

7. A method of making a non-woven fibrous material pad comprising the steps

- forming two continuous felt layers of indefinite length, each felt layer comprising a plurality of fibres; coating at least one surface of one of the layers with an adhesive 5 which is itself coloured or which includes a pigment, the colour of the adhesive differing from the colour or colours of the felt layers; superimposing the two layers of felt so that the adhesive coating forms an interlayer therebetween; and causing or permitting the adhesive to set and bond the 10 two felt layers together, so as to provide a visible indication of the thickness and continuity of the felt layers and the adhesive interlayer.
- 15 8. A method according to Claim 7 wherein a first layer of non-woven fibrous material is laid on a conveyor and the conveyor moves the layer of material under a first spraying zone at which said interlayer is sprayed thereon.
- 20 9. A method according to Claim 8 wherein a second layer of non-woven fibrous material is deposited on top of the sprayed first layer.
- 25 10. A method according to Claim 9 wherein the conveyor moves the second layer under a second spraying zone whereat an additional adhesive is sprayed thereon.
- 30 11. A method according to Claim 9 wherein the conveyor moves the pad past a third spraying zone whereat an additional coating of adhesive material is sprayed on to the opposite surface of the pad.
- 35 12. A method according to Claim 10 or Claim 11 wherein the additional adhesive is itself coloured or includes a coloured pigment.
13. A method according to Claim 10 or Claim 11 wherein the additional adhesive is colourless.
14. A method according to any one of Claims 7 to 13 wherein the adhesive comprises a cross-linkable acrylic copolymer binder resin.
15. A method according to any one of Claims 7 to 14 wherein the additional adhesive coating comprises a cross-linkable acrylic copolymer binder resin.
- 50 16. A method according to any one of Claims 7 to 15 wherein the fibrous material comprises by weight a mixture of approximately 45% crimped polyester fibre and 55% crimped acrylic fibre.
- 55 17. A pad according to any one of Claims 1 to 7 wherein the non-woven fibrous material comprises a mixture comprising by weight approximately 45% crimped polyester fibre and 55% crimped acrylic fibre.
18. A pad substantially hereinbefore described with reference to and as shown in Figure 1 of the accompanying drawings.
- 60 19. A method of making a non-woven fibrous material pad substantially hereinbefore described with reference to the accompanying drawings.
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